

## CLAIMS

We claim:

- 1 1. A template for bone milling, comprising:  
2 a frame having a top, a bottom, one or more external sidewalls, and one or more  
3 internal sidewalls, said frame having one or more openings extending there through from  
4 said top to said bottom wherein at least one of said one or more internal side walls defines a  
5 peripheral boundary of each of said one or more openings;  
6 a guide track formed in said one or more internal sidewalls, said guide track  
7 receiving a guide of a bone milling device whereby said bone milling device may be moved  
8 about said peripheral boundary using said guide track.
- 1 2. The template of claim 1 further comprising a means for removably securing said frame  
2 to a bone which is to be milled.
- 1 3. The template of claim 2 wherein said means for removably securing includes one or  
2 more tabs projecting from said frame which have one or more securing points which may be  
3 secured to a bone.
- 1 4. The template of claim 3 wherein said one or more tabs project from said one or more  
2 external sidewalls.
- 1 5. The template of claim 1 wherein said guide track is positioned approximately midway  
2 between said top and said bottom of said frame.
- 1 6. The template of claim 1 wherein said guide track has a flat lower surface which is  
2 approximately parallel to said top and said bottom of said frame.
- 1 7. The template of claim 1 wherein said guide track has an angled upper surface which  
2 projects at an angle from said lower surface to a point relatively closer to said top of said  
3 frame than said bottom of said frame.

1 8. The template of claim 1 wherein said guide track has an arcuate upper surface which  
2 extends from said lower surface to a point relatively closer to said top of said frame than  
3 said bottom of said frame.

1 9. The template of claim 1 wherein guide track has an arcuate lower surface and an angled  
2 upper surface which projects at an angle from said lower surface to a point relatively closer  
3 to said top of said frame than said bottom of said frame.

1 10. The template of claim 1 wherein said frame is curved to match one or more curves of a  
2 bone.

1 11. The template of claim 10 wherein said frame has a peripheral boundary in a shape  
2 configured to accommodate a femoral implant.

1 12. The template of claim 1 wherein said frame has a peripheral boundary in a shape  
2 configured to accommodate a tibial implant.

1 13. The template of claim 1 wherein said peripheral boundary has one or more bulbous  
2 regions.

1 14. A kit for partial knee replacement surgery; comprising:  
2 a plurality of tibial frames, each of said tibial frames having a top, a bottom, an  
3 external sidewall, and an internal sidewall, each of said tibial frames having an opening  
4 extending therethrough from said top to said bottom of said tibial frame wherein said  
5 internal side wall defines a peripheral boundary of said opening, each of said plurality of  
6 tibial frames having an opening sized to match one of said plurality of tibial implants;  
7 a guide track formed in said internal sidewall of each of said tibial frames, said  
8 guide track receiving a guide of a bone milling device whereby said bone milling device  
9 may be moved about said peripheral boundary using said guide track.

1 15. The kit of claim 14, further comprising at least one femoral frame having a top, a  
2 bottom, an external sidewall, and an internal sidewall, said at least one femoral frame  
3 having an opening extending therethrough from said top to said bottom of said femoral  
4 frame wherein said internal side wall defines a peripheral boundary of said opening wherein  
5 said opening is sized to match said at least one femoral implant.

1 16. The kit of claim 15 wherein said tibial frames are constructed from metal.

1 17. The kit of claim 14 wherein said tibial frames are constructed from plastic.

1 18. The kit of claim 14 wherein said tibial frames are constructed from ceramics.

1 19. The kit of claim 15 wherein said femoral frames is constructed from metal.

1 20. The kit of claim 15 wherein said femoral frame is constructed from plastic.

1 21. The kit of claim 15 wherein said femoral frame is constructed from ceramic.

1 22. The kit of claim 14 further comprising means for removably securing each of said tibial  
2 frames to a tibia bone.

1 23. The kit of claim 22 wherein said means for removably securing includes one or more  
2 tabs projecting from said tibial frame which have one or more securing points which may  
3 be secured to a tibia bone.

1 24. The kit of claim 23 wherein said one or more tabs project from said external side wall  
2 of said tibia frame.

1 25. The kit of claim 15 further comprising means for removably securing said at least one  
2 femoral frame to a femur bone.

- 1 26. The kit of claim 14 wherein said guide track in each of said tibial frames is positioned  
2 approximately midway between said top and said bottom of said tibial frame.
- 1 27. The kit of claim 14 wherein said guide track in each of said tibial frames has a flat  
2 lower surface which is approximately parallel to said top and said bottom of said tibial  
3 frame.
- 1 28. The kit of claim 14 wherein said guide track in each of said tibial frames has an angled  
2 upper surface which projects at an angle from said lower surface to a point relatively closer  
3 to said top of said frame than said bottom of said tibial frame.
- 1 29. The kit of claim 14 wherein said guide track in each of said tibial frames has an arcuate  
2 upper surface which extends from said lower surface to a point relatively closer to said top  
3 of said tibial frame than said bottom of said tibial frame.
- 1 30. The kit of claim 14 wherein guide track in each of said tibial frames has an arcuate  
2 lower surface and an angled upper surface which projects at an angle from said lower  
3 surface to a point relatively closer to said top of said tibial frame than said bottom of said  
4 tibial frame.
- 1 31. The kit of claim 14 wherein said peripheral boundary of at least one of said plurality of  
2 tibial frames has one or more bulbous regions
- 1 32. The kit of claim 15 further comprising a guide track formed in said internal sidewall of  
2 said at least one femoral frame, said guide track receiving a guide of a bone milling device  
3 whereby said bone milling device may be moved about said peripheral boundary using said  
4 guide track.
- 1 33. The kit of claim 32 wherein said guide track in said at least one femoral frame is  
2 positioned approximately midway between said top and said bottom of said femoral frame.

1 34. The kit of claim 32 wherein said guide track in said at least one femoral has a flat lower  
2 surface which is approximately parallel to said top and said bottom of said femoral frame.

1 35. The kit of claim 32 wherein said guide track in said at least one femoral frame has an  
2 angled upper surface which projects at an angle from said lower surface to a point relatively  
3 closer to said top of said femoral frame than said bottom of said femoral frame.

1 36. The kit of claim 32 wherein said guide track in said at least one femoral frame has an  
2 arcuate upper surface which extends from said lower surface to a point relatively closer to  
3 said top of said femoral frame than said bottom of said femoral frame.

1 37. The kit of claim 32 wherein guide track in said at least one femoral frame has an  
2 arcuate lower surface and an angled upper surface which projects at an angle from said  
3 lower surface to a point relatively closer to said top of said femoral frame than said bottom  
4 of said femoral frame.

1 38. The kit of claim 14 further comprising a bone milling device.

1 39. The kit of claim 38 wherein said bone milling device is a one time use disposable.

1 40. The kit of claim 38 wherein said bone milling device has a milling bit which is angled  
2 from a drive member.

1 41. The kit of claim 40 wherein said milling bit is angled at approximately 90 degrees from  
2 said drive member.

1 42. The kit of claim 38 wherein said bone milling device includes a peripheral flange  
2 which serves as said guide.

1 43. A kit for orthopedic surgery; comprising:  
2 a plurality of implants;  
3 a plurality of frames, each of said frames having a top, a bottom, an external  
4 sidewall, and an internal sidewall, each of said frames having an opening extending  
5 therethrough from said top to said bottom of said frame wherein said internal side wall  
6 defines a peripheral boundary of said opening, each of said plurality of frames having an  
7 opening sized to match one of said plurality of tibial implants; and  
8 a guide track formed in said internal sidewall of each of said frames, said guide  
9 track receiving a guide of a bone milling device whereby said bone milling device may be  
10 moved about said peripheral boundary using said guide track.

1 44. The kit of claim 43 wherein said frames are constructed from metal.

1 45. The kit of claim 43 wherein said frames are constructed from plastic.

1 46. The kit of claim 43 wherein said frames are constructed from ceramics.

1 47. The kit of claim 43 further comprising means for removably securing each of said  
2 frames to a bone.

1 48. The kit of claim 47 wherein said means for removably securing includes one or more  
2 tabs projecting from said tibial frame which have one or more securing points which may  
3 be secured to a bone.

1 49. The kit of claim 48 wherein said one or more tabs project from said external side wall  
2 of said frame.

1 50. The kit of claim 43 wherein said guide track in each of said frames is positioned  
2 approximately midway between said top and said bottom of said frame.

- 1 51. The kit of claim 43 wherein said guide track in each of said frames has a flat lower  
2 surface which is approximately parallel to said top and said bottom of said frame.
- 1 52. The kit of claim 43 wherein said guide track in each of said frames has an angled upper  
2 surface which projects at an angle from said lower surface to a point relatively closer to said  
3 top of said frame than said bottom of said frame.
- 1 53. The kit of claim 43 wherein said guide track in each of said frames has an arcuate upper  
2 surface which extends from said lower surface to a point relatively closer to said top of said  
3 frame than said bottom of said frame.
- 1 54. The kit of claim 43 wherein guide track in each of said frames has an arcuate lower  
2 surface and an angled upper surface which projects at an angle from said lower surface to a  
3 point relatively closer to said top of said frame than said bottom of said frame.
- 1 55. The kit of claim 43 wherein said peripheral boundary of at least one of said plurality of  
2 frames has one or more bulbous regions.
- 1 56. The kit of claim 43 further comprising a bone milling device.
- 1 57. The kit of claim 56 wherein said bone milling device is a one time use disposable.
- 1 58. The kit of claim 56 wherein said bone milling device has a milling bit which is angled  
2 from a drive member.
- 1 59. The kit of claim 58 wherein said milling bit is angled at approximately 90 degrees from  
2 said drive member.
- 1 60. The kit of claim 56 wherein said bone milling device includes a peripheral flange  
2 which serves as said guide.

- 1 61. A bone milling method, comprising the steps of:  
2 affixing to a joint region of a bone a template having  
3 (i) a frame having a top, a bottom, one or more external sidewalls, and one  
4 or more internal sidewalls, said frame having one or more openings extending therethrough  
5 from said top to said bottom wherein at least one of said one or more internal side walls  
6 defines peripheral boundary of each of said one or more openings, and  
7 (ii) a guide track formed in said one or more internal sidewalls; and  
8 milling a portion of said joint region of said bone using a bone milling device  
9 having a guide which is received in said guide track by moving said bone milling device  
10 about said peripheral boundary using said guide track to guide said bone milling device.
- 1 62. The method of claim 61 wherein said milling step leaves a central plateau in said joint  
2 region which is removed by said bone milling device without using said template.
- 1 63. The method of claim 61 further comprising the step of controlling a depth of milling by  
2 said bone milling device.
- 1 64. The method of claim 63 wherein said step of controlling is achieved by selecting a  
2 thickness of said frame affixed to said bone in said affixing step.
- 1 65. The method of claim 63 wherein said step of controlling is achieved by selecting a  
2 position of said guide track in said frame affixed to said bone in said affixing step.
- 1 66. The method of claim 63 wherein said step of controlling is achieved by selecting a size  
2 of a burr used in said milling step.
- 1 67. A template for bone milling, comprising:  
2 a frame having a top, a bottom, one or more external sidewalls, and one or more  
3 internal sidewalls, said frame having one or more openings extending there through from  
4 said top to said bottom wherein at least one of said one or more internal side walls defines a  
5 peripheral boundary of each of said one or more openings; and



6 a pre-bent fastening means for removably securing said frame to a posterior surface  
7 of a bone which is to be milled.

1 68. The template of claim 67, wherein said pre-bent fastening means is at least one pre-bent  
2 tab.

1 69. The template of claim 67, wherein said pre-bent fastening means is at least one pre-bent  
2 hook.

1 70. The template of claim 67 further comprising a means for removably securing said  
2 frame to an anterior surface of a bone which is to be milled.

1 71. The template of claim 70 wherein said means for removably securing includes one or  
2 more tabs projecting from said frame which have one or more securing points which may be  
3 secured to a bone.

1 72. The template of claim 71 wherein said one or more tabs project from said one or more  
2 external sidewalls.

1 73. The template of claim 67 wherein said frame is curved to match one or more curves of  
2 a bone.

1 74. The template of claim 67 wherein said frame has a peripheral boundary in a shape  
2 configured to accommodate a femoral implant.

1 75. The template of claim 67 wherein said frame has a peripheral boundary in a shape  
2 configured to accommodate a tibial implant.

1 76. The template of claim 67 wherein said peripheral boundary has one or more bulbous  
2 regions.

1 77. The template of claim 67 wherein said template further comprises  
2 a guide track formed in said one or more internal sidewalls, said guide track  
3 receiving a guide of a bone milling device whereby said bone milling device may be moved  
4 about said peripheral boundary using said guide track.

1 78. A bone milling method, comprising the steps of:  
2 affixing to a joint region of a bone a template having  
3 (i) a frame having a top, a bottom, one or more external sidewalls, and one  
4 or more internal sidewalls, said frame having one or more openings extending therethrough  
5 from said top to said bottom wherein at least one of said one or more internal side walls  
6 defines peripheral boundary of each of said one or more openings, and  
7 (ii) a pre-bent fastening means for removably securing said frame to a  
8 posterior surface of a bone which is to be milled; and  
9 milling a portion of said joint region of said bone using a bone milling device.

1 79. The bone milling method of claim 78, wherein said bone milling device has a flange  
2 with a flat surface that rests on said top of said frame, said bone milling device moving  
3 about said peripheral boundary using said internal sidewall to guide said bone milling  
4 device.

1 80. The bone milling method of claim 78, wherein said frame further comprises  
2 a guide track formed in said one or more internal sidewalls, said guide track  
3 receiving a guide of a bone milling device whereby said bone milling device may be moved  
4 about said peripheral boundary using said guide track.

1 81. The method of claim 78, wherein said fastening means is at least one pre-bent tab.

1 82. The method of claim 78, wherein said fastening means is at least one pre-bent hook.

1 83. The method of claim 78 further comprising the step of controlling a depth of milling by  
2 said bone milling device.

1 84. The method of claim 83 wherein said step of controlling is achieved by selecting a  
2 thickness of said frame affixed to said bone in said affixing step.

1 85. The method of claim 83 wherein said step of controlling is achieved by selecting a size  
2 of a burr used in said milling step.

1 86. A bone milling kit, comprising:  
2 a plurality of implants; and  
3 a plurality of frames, each of said frames having a top, a bottom, an external  
4 sidewall, and an internal sidewall, each of said frames having an opening extending  
5 therethrough from said top to said bottom of said frame wherein said internal side wall  
6 defines a peripheral boundary of said opening, each of said plurality of frames having an  
7 opening sized to match one of said plurality of tibial implants, each frame comprising a pre-  
8 bent fastening means for removably securing said frame to a non-exposed surface of a bone  
9 which is to be milled.

1 87. The kit of claim 86 wherein said frames are constructed from a material selected from  
2 the group consisting of metal, plastic, and ceramics.

1 88. The kit of claim 86 further comprising means for removably securing each of said  
2 frames to an exposed surface of a bone.

1 89. The kit of claim 88 wherein said means for removably securing includes one or more  
2 bendable tabs projecting from said frame which have one or more securing points which  
3 may be secured to an exposed surface of a bone.

1 90. The kit of claim 89 wherein said one or more bendable tabs project from said external  
2 side wall of said frame.

1 91. The kit of claim 86 wherein said peripheral boundary of at least one of said plurality of  
2 frames has one or more bulbous regions.

- 1 92. The kit of claim 86 further comprising a bone milling device.
- 1 93. The kit of claim 92 wherein said bone milling device includes a cutting means with a  
2 peripheral flange with a bottom surface which rests on said top of said frame during  
3 milling, thereby controlling the depth of cutting of said cutting means.
- 1 94. The kit of claim 92 wherein said bone milling device is a one time use disposable.
- 1 95. The kit of claim 92 wherein said bone milling device has a milling bit which is angled  
2 from a drive member.
- 1 96. The kit of claim 95 wherein said milling bit is angled at approximately 90 degrees from  
2 said drive member.
- 1 97. The kit of claim 86 wherein said implants are tibial implants and said frames are tibial  
2 frames.
- 1 98. The kit of claim 86 wherein said implants are femoral implants and said frames are  
2 femoral frames.
- 1 99. A bone milling kit, comprising,  
2 at least one frame having a top, a bottom, an external sidewall, and an internal  
3 sidewall, said at least one frame having an opening extending therethrough from said top to  
4 said bottom of said frame wherein said internal side wall defines a peripheral boundary of  
5 said opening; and  
6 a milling device with a cutting means and a flange, a bottom surface of said flange  
7 riding on said top of said frame and a side surface of said flange abutting against said frame  
8 during milling, thereby controlling the depth of cutting by said cutting means.
- 1 100. The kit of claim 99 further comprising one or more means for removably securing said  
2 frame to a bone which is to be milled.

1 101. The kit of claim 100 wherein said one or more means for removably securing said  
2 frame to a bone is a pre-bent fastening means for removably securing said frame to an un-  
3 exposed surface of a bone which is to be milled.

1 102. The kit of claim 100 wherein said one or more means for removably securing includes  
2 one or more bendable tabs projecting from said frame which have one or more securing  
3 points which may be secured to an exposed surface of a bone.

1 103. The kit of claim 100 wherein said at least one frame is a tibial frame.

1 104. The kit of claim 100 wherein at least one frame is a femoral frame.

1 105. A bone milling device, comprising  
2 a drive member;  
3 a cutting means; and  
4 a radial support means, wherein said radial support means projects along an outer  
5 circumference of said cutting means, and wherein said cutting means projects beyond said  
6 radial support means by a distance equal to a depth of a cut made by said cutting means.

1 106. The bone milling device of claim 105, wherein said radial support means partially  
2 circumscribes said cutting means.

1 107. The bone milling device of claim 105 wherein said radial support means fully  
2 circumscribes said cutting means.

1 108. A method of milling a bone, comprising the steps of  
2 contacting a surface of said bone with a bone milling device comprising  
3 a drive member,  
4 a cutting means, and  
5 a radial support means, wherein said radial support means projects along an  
6 outer circumference of said cutting means, and wherein said cutting means projects

7           beyond said radial support means by a distance equal to a depth of a cut made by  
8           said cutting means; and  
9           milling a portion of said bone by guiding said bone milling device along said surface  
10 of said bone.

1   109. A bone milling kit, comprising  
2           a femoral bone milling device, comprising  
3                a drive member,  
4                a cutting means, and  
5                a radial support means, wherein said radial support means projects along an  
6           outer circumference of said cutting means, and wherein said cutting means projects  
7           beyond said radial support means by a distance equal to a depth of a cut made by  
8           said cutting means; and  
9           at least one femoral implant.

1   110. The bone milling kit of claim 109, further comprising  
2           at least one tibial implant, at least one tibial template, and a milling device for use  
3   with said tibial template.

1   111. A bone milling apparatus, comprising  
2           i) a cutting device comprising  
3                a drive member,  
4                a cutting means, and,  
5                a chucking mechanism connecting said drive member to said cutting means;  
6   and  
7           ii) a frame having a top surface and a bottom surface, said frame having a slot  
8           extending there through from said top surface to said bottom surface, and at least one  
9           support means disposed on said bottom surface;  
10           wherein said chucking means extends through said slot, and wherein a bottom  
11           surface of said cutting means projects beyond said support means by a distance equal to a  
12           depth of a cut made by said cutting means.

1 112. The bone milling apparatus of claim 111, further comprising a latching mechanism to  
2 reversibly fix said cutting device at a position along said slot.

1 113. A method of milling a bone, comprising the steps of  
2 contacting a surface of said bone with a bone milling apparatus, comprising  
3 i) a cutting device comprising  
4 a drive member,  
5 a cutting means, and,  
6 a chucking mechanism connecting said drive member to said cutting means;  
7 and  
8 ii) a frame having a top surface and a bottom surface, said frame having a slot  
9 extending there through from said top surface to said bottom surface, and at least one  
10 support means disposed on said bottom surface;  
11 wherein said chucking means extends through said slot, and wherein a bottom  
12 surface of said cutting means projects beyond said support means by a distance equal to a  
13 depth of a cut made by said cutting means; and  
14 milling a portion of said bone surface by guiding said bone milling apparatus over  
15 said surface of said bone.

1 114. The method of claim 113, wherein said bone milling apparatus further comprises a  
2 latching mechanism to reversibly fix said cutting device at a position along said slot.

1 115. A bone milling kit, comprising,  
2 a bone milling apparatus, comprising  
3 i) a cutting device comprising  
4 a drive member,  
5 a cutting means, and,  
6 a chucking mechanism connecting said drive member to said cutting means;  
7 and  
8 ii) a frame having a top surface and a bottom surface, said frame having a slot  
9 extending there through from said top surface to said bottom surface, and at least one

10 support means disposed on said bottom surface;  
11 wherein said chucking means extends through said slot, and wherein a bottom  
12 surface of said cutting means projects beyond said support means by a distance equal to a  
13 depth of a cut made by said cutting means; and  
14 iii) an implant.

1 116. The bone milling kit of claim 115 further comprising at least one tibial implant, at least  
2 one tibial template, and a milling device for use with said tibial template.

1 117. The bone milling kit of claim 115, wherein said bone milling apparatus further  
2 comprises a latching mechanism to reversibly fix said cutting device at a position along said  
3 slot.

1 118. The kit of claim 14 further comprising a plurality of tibial implants and at least one  
2 femoral implant.

1 119. The kit of claim 15 wherein said femoral frame is curved to match at least one curve  
2 of a femur bone.

1 120. The bone milling kit of claim 99 further comprising at least one implant.

1 121. The bone milling kit of claim 99, wherein said at least one frame is a plurality of  
2 frames.